1998

The Artistic and Scientific Collaboration of Blanche Ames Ames and Adelbert Ames II

Roy R. Behrens
University of Northern Iowa

The Artistic and Scientific Collaboration of Blanche Ames Ames and Adelbert Ames II

Roy R. Behrens

ABSTRACT

During an uninterrupted period from about 1910 through 1913, Blanche Ames Ames (1878–1969), an American artist and women's suffragist, worked closely with her brother, Adelbert Ames II (1880–1955), a lawyer, artist and optical physiologist, in a study of color, perspective and other aspects of pictorial art in the hope of using scientific findings to enhance the realism of their paintings. They made significant progress, but their close relationship ended in 1922 as a result of a disagreement about their joint authorship of a published paper.

BACKGROUND

Blanche Ames Ames (1878–1969) was an American artist, inventor and women's suffragist [1]. Her brother, Adelbert Ames II (1880–1955), was a lawyer and artist who became well-known later in life for his discoveries in optical physiology and perceptual psychology [2]. During an uninterrupted period from about 1910 through 1913, they worked together in the study of color, perspective and other aspects of pictorial art, in the hope of using scientific findings to enhance the realism of their paintings. The setting for this artistic and scientific collaboration was Borderland, a vast wooded estate about 20 miles south of Boston near North Easton, Massachusetts.

Blanche Ames became Blanche Ames Ames by her marriage in 1900 to Oakes Ames (1874–1950) (of an unrelated family), a Harvard botanist and an authority on orchids. Her brother Adelbert was commonly known as Del Ames. The fourth and fifth, respectively, of six children, Blanche and Del bore the same given names as their parents, who were distinguished and affluent residents of Lowell, Massachusetts [3].

Their father was General Adelbert Ames, a West Point graduate and Civil War hero who received the Congressional Medal of Honor at the First Battle of Bull Run and, following the war, served as a U.S. Senator and Governor of Mississippi during the Reconstruction. Their mother was Blanche Butler, who was the daughter of Sarah Hildreth, a Shakespearean actress, and General Benjamin F. Butler, one of the most outspoken and controversial figures of the U.S. Civil War. General Butler also later served as the Governor of Massachusetts and as a member of the U.S. House of Representatives and was an unsuccessful presidential candidate.

Blanche Ames Ames's lifelong interest in the rights of women may have been partly inspired by the example of General Butler, who, in 1871, was one of the first American politicians to support women's suffrage. In addition, both her parents were advocates of mutual regard between men and women—so much so that, while promising to love and honor each other in their wedding vows, they deleted the traditional pledge of the bride to obey.

The fascination of the Ames children with visual art may also have resulted from the example of their parents. As a young man, while sailing on his father's ships, General Ames had dabbled in watercolor painting; Blanche Butler Ames, who had studied painting at a convent school in Washington, D.C., was an occasional oil painter.

Further, both parents were avidly interested in mechanical invention: Mrs. Ames invented a non-sticky and non-wrinkling laundry starch; General Ames designed a portable pencil sharpener, an extension ladder for fire engines, flour mill machinery and a method of canal barge propulsion. Of their six children, three (Butler, Blanche and Adelbert II)

Fig. 1. Edmund C. Tarbell, *Portrait of Blanche Ames*, oil on canvas, 44½ × 34½ in, 1907. This painting by Tarbell, a prominent American Impressionist, was commissioned by Blanche Ames Ames's husband, Harvard botanist Oakes Ames. (Courtesy of Oakes Plimpton and Borderland State Park)

Roy R. Behrens (artist, writer, teacher), 2022 X Avenue, Dysart, IA 52224-9767, U.S.A.
E-mail: <ballast@netins.net>.

are officially credited with dozens of patented inventions, among them Butler Ames's designs for an early pressure cooker, automotive windshield wipers and the radiant heat stove, a forerunner of the self-cleaning oven.

It is indicative of her parents' progressive attitudes that Blanche Ames Ames was one of the few women of her generation to attend college. In 1895, she enrolled at Smith College, where 4 years later she received a bachelor's degree in art history and a diploma in studio art from the Smith Art School. As class president, she delivered a commencement speech in which she observed that the graduates were "most fortunate to live in an age that—more than any other—makes it possible for women to attain the best and truest development in life" [4].

One year later, she married Oakes Ames, whose family was known for its pivotal role in financing the Union Pacific Railroad, ownership of the lucrative Ames Shovel Company and patronage of the well-known architect H.H. Richardson. While Blanche's young husband was supportive of the concept of equality for women, his mother was less sympathetic at first. An aristocratic matriarch whose late husband had been Governor of Massachusetts, she could not bear to have her son move out of the family mansion. As a result, in what must have been painfully difficult days for an enlightened young woman, the newlyweds lived with Oakes's mother in North Easton for the first 6 years of their marriage.

During this period, the couple had two children. Several years later, after having finally moved to a home of their own, they had two more children. Their oldest child, a daughter named Pauline, became the mother of American writer George Plimpton. The home the young family moved to was a large farmhouse on 1,200 acres of tillable land, woods and ponds, 4 miles west of North Easton. They called the property Borderland because it encompassed land from several adjoining communities.

Before his marriage, Oakes Ames had illustrated his own scientific papers on orchids, for the purpose of which he took lessons in watercolor painting. As early as 1902, however, Blanche began to illustrate her husband's publications, beginning with watercolors, then switching to copperplate etchings. Throughout her life, she published dozens of intricate pen and ink drawings of orchids, for which she used a camera lucida and a specially designed combination microscope and camera. In 1924, she designed the Gold Medal for the American Orchid Society.

Blanche was also interested in oil painting, particularly portrait painting, an involvement that may have been spurred by the fact that in 1906 Oakes hired a prominent artist, Edmund C. Tarbell, to paint a portrait of Blanche in her wedding dress. A highly regarded Boston painter, Tarbell was a member of The Ten, a group of American Impressionists. A superb example of Tarbell's work, the portrait (Fig. 1) cost $2,000 and required more than 24 sittings, with the artist travelling in by train.

In 1911 the couple moved again, this time to a huge and magnificent home designed by Blanche herself. Located on their Borderland property on high ground overlooking a pond, the house had walls of fieldstone gathered from the property; the floors were of reinforced concrete. The three-story structure had 22,000 square feet, with 15 large rooms, 10 fireplaces and eight bathrooms. Now known as Borderland State Park, the estate was acquired by the State of Massachusetts in 1971, 2 years after Blanche's death, and is currently open to the public.

Initially, the Ameses had retained a Boston architect to design their home, but he failed repeatedly to accommodate their suggestions. In 1909, they dismissed him, which led to a painful and prolonged lawsuit and to Blanche's ambitious decision to serve as her own architect. Throughout the lawsuit, the couple was defended by Alfred Hemenway, a lawyer in the firm with which Blanche's brother Del was also associated.

Meanwhile, the life of Del had taken its own course. In 1899, he entered Harvard University, where among his most memorable teachers were William James and George Santayana. Despite an apparent inclination toward philosophy and psychology, he chose to become a lawyer, graduating from Harvard Law School in 1906. Admitted to the Massachusetts bar, he joined the Boston law firm of Long and Hemenway. Another young lawyer at the firm was A. Henry Higginson, whose father was Henry Lee Higginson, director of the Shawmut Bank.

While working as a lawyer, Del led the lifestyle of an arrogant socialite, a life that he later described as "the easy existence of the well-to-do" [5]. His only social contacts were "about twenty families in Boston, half that many in New York, and a few in Philadelphia" [6]. He became proficient at polo, and in 1910 he won the Junior Division Championship of the U.S. Polo Association. He spent a significant part of his time playing cards and betting on horse races. Throughout this period, he "thought of the world as his plaything, but at the same time he was deeply concerned. It was all too easy. He wasn't 'paying his way'" [7].

Although the time and exact circumstances of it are unclear, a personal crisis occurred in his life, probably around 1910. While gambling in Saratoga Springs, New York, he decided suddenly to resign from the law firm, an action he later attributed to the realization that his belief "that the law dealt with equity and justice" was unfounded [8], and arranged to dissolve his engagement to Margaret (Peggy) James, the daughter of William James. "Disillusioned in the law and disappointed in love" [9], as he was later described by a niece, he was determined to find a career "that would take all his energy, all his imagination, all his skill, and yet extend far out of his grasp" [10].

At age 30, unemployed and unmarried, he decided to give up his upper-class life to become a professional artist—"I had made drawings since I was a boy," he recalled later, "and I had a real desire to learn to paint" [11]. He converted a police paddy wagon into a makeshift mobile home, travelling in the summer, painting landscapes *en plein air*. In the winter he lived in a single room in a rooming house in Boston.

However progressive they were in other respects, his family was horrified by this bizarre behavior, as were his wealthy, conventional friends. Of the two or three friends who remained close to him, A. Henry Higginson was one. His family "now mildly considered him an outcast" [12]; the one person who staunchly remained on his side was his sister Blanche.

COLLABORATION

Shortly after Del's resignation from the law firm, the Shawmut Bank commissioned him to paint a large portrait of the bank's symbol, a Native American named Obbatinewat, the leader who greeted the colonists in 1621.

He decided to work in a roundabout way, beginning by creating a sculpture to use as a model from which to paint. In early 1912, after struggling with the portrait bust for more than a year, he showed it to the bank executives, who

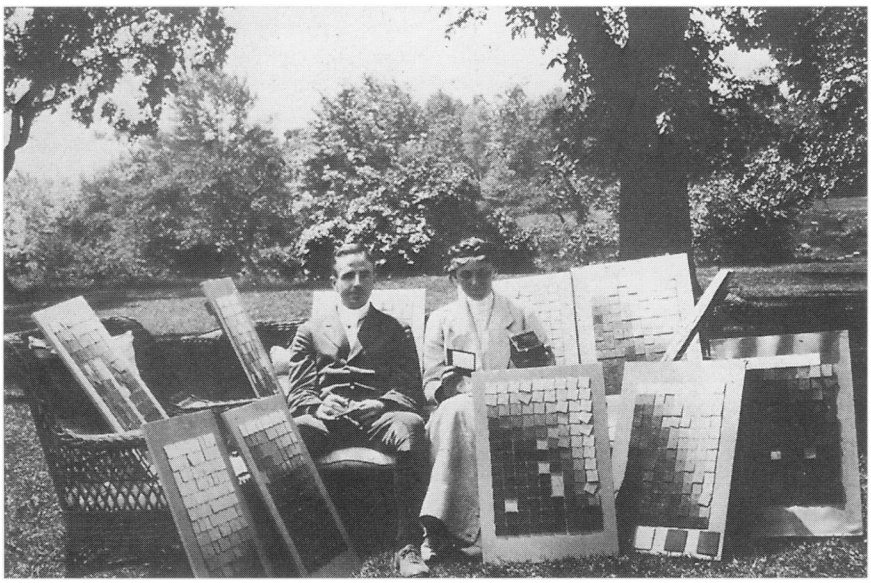

Fig. 2. Adelbert Ames II and his sister, Blanche Ames Ames, seated on the lawn at Borderland (now Borderland State Park), near North Easton, Massachusetts. They are surrounded by the color charts with which they investigated the relationship between visual perception and pictorial realism in painting. (©1997 Ames heirs. Courtesy of Oakes Plimpton. Collection of the author.)

canceled their request for a painted version and decided to purchase the sculpture instead. That same year, a bronze casting was placed on display in the lobby of the bank at 40 Water Street in Boston, and a graphic interpretation was eventually adopted as the bank's well-known trademark.

While working on the Shawmut bust, Del sought the advice of his sister. She offered to help him learn to paint and, with the completion of her new home, to share her studio with Del as he worked to accomplish his change of career. At the same time, either working alone or in concert with Del, Blanche had begun to develop a plan for a complex color notation system.

More extensive than the famous Munsell Color System, the Ames system (Fig. 2) was made up of approximately 3,300 variations of hues, values and intensities, precisely computed and painted on cards, then labeled with a code that matched the same number and variety of tubes of paint. While painting, an artist would employ the cards in the following way: Using a combination of photographic reference and direct observation, the artist would prepare a detailed drawing of the subject, then match colors of the scene with swatches from the color system. The corresponding color codes were noted on the drawing and, when virtually all of the parts of the scene had been matched with color swatches, the appropriate colors of paint were applied.

It appears that this system was probably used for the first time on 13 February 1912, when Blanche began painting a still life consisting of "a copper urn and several different fabrics artistically draped" [13]. By that time, she and Del were sharing her studio, but he was still working on the Shawmut Bank sculpture. On 22 February, she began a second painting, consisting of a jewel box and satin drapery.

Meanwhile, their excitement about the color system mounted, and on 18 March, having at last completed the Shawmut bust, Del gave his full attention to their collaboration. During the next 2 weeks, Blanche and he investigated paint chemistry and color notation, began work on an improved version of the color system and constructed a grid-divided drawing frame.

This drawing frame had been invented in the 15th century by the Italian architect Leone Battista Alberti, then reconstructed in various forms by Leonardo da Vinci, Albrecht Dürer and numerous other artists, even Vincent Van Gogh [14]. It consisted of an empty frame, either square or rectangular, divided into smaller squares by stretching strings from side to side within it.

When used in drawing, the frame was placed in front of the artist, so he or she would view the model through the framework. One of the artist's eyes would have to remain closed and the head motionless as the view of the model was translated to a piece of drawing paper, prepared with a smaller but corresponding grid pattern.

If the drawing frame was derivative, the manner in which Blanche and Del used it was innovative: In addition to drawing with it, they photographed the subject or model through it, resulting in reference photographs that were automatically "squared off," making it easier to convert the photographs to drawings.

On 25 March, Del began a painting of an interior view of the house for the purpose of learning perspective, while Blanche started a portrait of Oakes, to test the effectiveness of the color system in simulating flesh tones. Del finished his painting on 22 April, and together Blanche and he returned to perfecting the color swatches and corresponding tubes of paint, a task that required enormous labor and that they finally completed about a year later.

They had a breakthrough in the fall, when they used the color system to make a painting of an elm tree at Borderland (Fig. 3). The effect of this painting, as one writer said, was "startling," because of its painstaking detail and its convincing illusion of depth [15].

However, during this same period, two other critical issues were raised, one theoretical, the other personal: First, Blanche and Del became concerned about the implications of binocular vision and the fact that perception is normally based on the fusion of two different points of view—not a single point of view—for the simple reason that we see with two eyes, spaced apart. This matter came up on the day they made the drawing frame, which works best if one eye remains closed, and it came up again when Del began to paint a scene in perspective, because, to a degree, certain kinds of perspective are also dependent on the use of one eye only.

As a result, all sorts of questions began to arise about the relationship between human perception and realistic representation in art. If normal vision is binocular, why then were paintings traditionally made with monocular devices, such as drawing frames and perspective? Should artists make a copy of the retinal image of a single eye, or should they simulate the view that results from the brain's fusion of two retinal images? What constitutes "realism" in painting? Or, even more fundamentally, of what does "realistic" perception consist?

Second, there was an apparently ominous change in the attitude of Blanche's husband. It was especially evident on 10 May 1912, when Blanche and Del (who

had been working side by side in the studio all day, almost daily, with only occasional visits by Oakes) decided to put on costumes to attend a fancy dress ball, while Oakes (who was sometimes described as moody, even anti-social) had decided to remain at home.

The entry in Oakes's diary reads as follows:

> Blanche and Adelbert were in fancy costume. Blanche was elaborately made up and verged on cheapness. After dinner she added more paint and looked too much like a street woman to please my taste. It was ten minutes after two Saturday morning when she came home and half past two before she was ready for bed [16].

The next morning, according to Oakes's diary, a somewhat unpleasant encounter occurred:

> I got up a little later than usual. Blanche got up too, looking a bit seedy in spite of the remains of the rouge which she was unable to remove last night, or rather early this morning. I told her frankly that her conduct had displeased me, and that owing to her run down condition she should have returned home at a more reasonable hour. She resented my criticism and, as usual, retorted that my remarks were unfair. Adelbert got up late and I saw nothing of him in the forenoon. . . . After supper I worked on Elmer's orchids. Blanche sat with Adelbert in the living room [17].

Before this incident, Oakes had always praised the work of Blanche and Del in his diary, but on 13 May, 2 days before their 10th wedding anniversary, he became openly critical of Blanche's paintings—she "fails in artistic arrangement," he said—and at the end of the entry he wrote, "I don't see much of Blanche during the day time now, and in the evenings she sits with Adelbert in the living room" [18]. Later, on 15 August, he recorded this comment: "I feel strongly that Blanche is giving too much time to studio work. She and Adelbert may arrive at some useful results in the end, but at present they are working as physicists rather than artists" [19].

Soon after, Del stopped working at Borderland, and in December Blanche and he rented a studio on Dartmouth Street in Boston, a move that may partly have been the result of Oakes's apparent jealousy. However, most likely it also occurred because Blanche and Del had decided that they should not continue their research until at least one of them learned more about the science of perception. Conveniently, one of the leading authorities on optical physiology was John Wallace Baird, a psychologist at Clark University in Worcester, about 30 miles southwest of Boston. Del began to work with Baird in 1913, and the following year he was granted a research fellowship from the same institution, where he remained until 1917.

During the period of about 1913 through 1917, there was a gradual decrease in the intensity of Blanche and Del's collaborative work. In part, this was probably due to the fact that they no longer lived and worked in the same space at Borderland, and no longer were both of them working in art. While they continued to share an artist's studio in Boston, Del was increasingly giving his time to scientific research in Worcester.

However, no doubt it was also the consequence of the increasingly active involvement of Blanche in the American Woman Suffrage Association. While always forthright in her support of women's rights, she had declined to participate in suffrage activities before 1913, because she was too busy with her collaborative work with Del. However, when it became evident that the issue would soon appear on a state ballot, she became extraordinarily active. As treasurer of the Massachusetts Woman Suffrage Association and president of the Easton Woman Suffrage League, she participated in more than 30 suffrage meetings, rallies and other gatherings during 1914, and in 43 the following year. Her husband Oakes served as the chair of the campaign committee of the Men's League for Women's Suffrage, and their Borderland home became a bustling center for suffrage activity, with the library serving as a makeshift lecture hall.

In 1915, Blanche began to use her art toward the promotion of suffrage by preparing a series of eight editorial cartoons (Fig. 4), most of which were published in Lucy Stone's *Woman's Journal,* which Blanche had become the art editor of, and in the *Boston Transcript.* One of these even provoked a response from U.S. President William Howard Taft in an article in the *Saturday Evening Post* [20]. Nevertheless, despite the best efforts of Blanche and Oakes, the amendment to the state constitution was defeated on 2 November 1915. But the battle continued on a national level and in August 1920 American women were granted the right to vote with the ratification of the 19th Amendment to the U.S. Constitution.

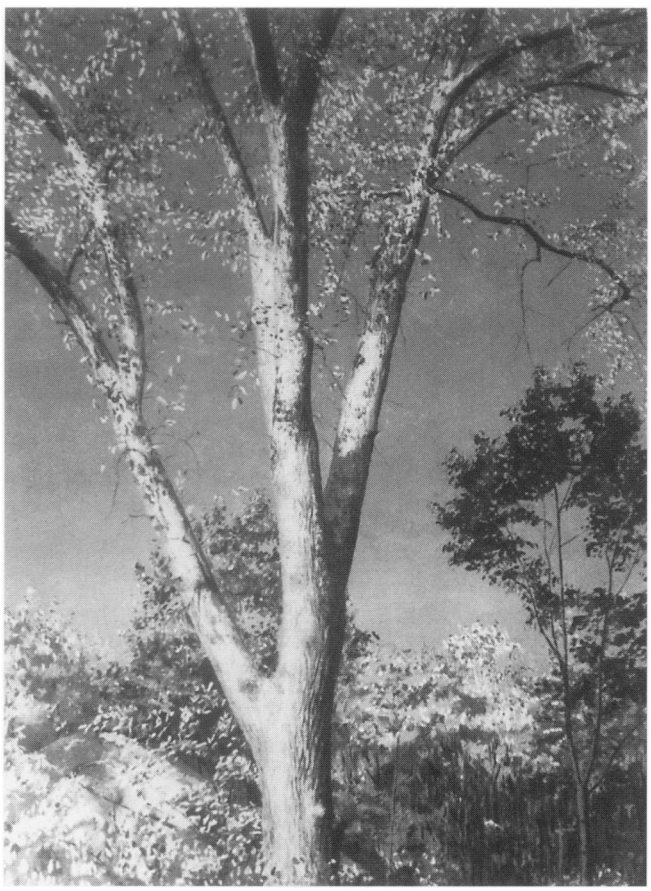

Fig. 3. Blanche Ames Ames, *Elm Tree*, oil on canvas, 30 × 20 in, 1912. Blanche Ames Ames and her brother, Adelbert Ames II, used their color charts to make this painting of an elm tree at Borderland. (© 1997 Ames heirs. Courtesy of Oakes Plimpton and Borderland State Park.)

Meanwhile, the United States had entered World War I in April 1917. Volunteering for military service, Del became a captain in the Air Service of the U.S. Army Signal Corps, where he served first as an aerial observer and photographer. While unable to contribute to Blanche's and his collaborative work, it was still on his mind: "How is the painting going?" he inquired in a wartime letter to Blanche, "I am continually more impressed with the correctness of the lines we are following" [21].

Later Del was transferred to Washington, D.C., where he was placed in charge of a machine shop where prototypes for instruments (including some optical instruments) were designed, constructed and tested. At this machine shop, he developed a strong friendship with Charles A. Proctor, a physics professor at Dartmouth College in Hanover, New Hampshire, who had a particular interest in lenses and prisms.

When the war ended, Del might have returned to Clark University to continue his study of physiological optics, except that the person with whom he had previously worked, John Wallace Baird, died in 1919. Instead, he accepted the suggestion of Proctor that he continue his research at Dartmouth.

DISPUTE

Before moving to Dartmouth, Del had never published a scientific paper. But during the period of 1921 to 1923, while sharing a laboratory with Proctor in Dartmouth's Wilder Hall, he published four major research articles.

The first of these, entitled "Systems of Color Standards" (1921), was a comparative summary of a variety of color notation systems, with an account of the color charts that Blanche and he had invented. Del is listed as the sole author of the paper, although he mentions that "this [color] standard, which is in triplicate and has never been published, was made by the writer and his sister, Mrs. Oakes Ames, before Ridgway's last edition came out and before Munsell completed his work" [22].

In the second and third articles, entitled "Dioptrics of the Eye" (1921) and "Aberrations of the Eye" (1923), Del is listed with Proctor as coauthor of the papers [23]. Earlier, while at Clark University, Del and Baird had investigated the sensitivity to color of various parts of the retina, a task that led to their research of aberrations of the lens system. These papers reported their findings about the dioptrics of the eye, the structure and function of its refractive lens system.

The fourth article, entitled "Vision and the Technique of Art" (1923) [24], was formally presented to the American Academy of Arts and Sciences on 11 January 1922. This paper is especially important: first, because it consists of a detailed account of the link between art and physiological optics that Blanche and Del, as artists, had begun to investigate at Borderland and that Del and Proctor, as scientists, had continued to research at Dartmouth; and second, because it ended Blanche and Del's relationship for the reason that, in initial drafts of the paper, only Del and Proctor were listed as the article's authors, with no joint authorship credited to Blanche.

In this article, it is stated that Blanche and Del, while painting collaboratively in 1912, had concluded that a painting should bear the same visual characteristics as a retinal image, that it "should be similar in its general characteristics to the pictures we receive on our retinas while holding one center of focus" [25]. As a result, only those features of the artist's view that fall within the line of sight would be clearly in focus. All other areas of the painting would be more or less out of focus, including all peripheral areas, both horizontal and vertical, and those that are nearer and farther away. In addition, consistent with the characteristics of retinal images, the painting would exhibit chromatic aberrations (due to wavelength variance and the curve of the retinal plane) and barrel distortion (because of the curve of the retinal plane).

To understand what such a painting might look like, it is particularly helpful to see an oil painting that Blanche completed in February 1922. Entitled *Fruit and Candles* (Fig. 5), it is a diagonal view of a bowl of apples, grapes and other fruit, positioned on a table top, with an ornate candleholder and candle on each end of the table. Looking at the painting, one can see that the bowl of fruit, which is in the exact center of the canvas, was the artist's center of focus. Portions of the bowl and fruit are precisely focused, while all other parts of the painting are blurred. Color intensity and value contrast are greatest near the center of focus, and, to simulate barrel distortion, the candlesticks are slightly bent. When properly viewing the painting, the viewer's center of focus is the same as the artist's, which leads to an increased illusion of depth.

Even though Blanche and Del had invented this method of painting as early as 1912, this demonstration of the method was not completed until 10 years later because it was only at that time that Del was able to provide Blanche with an optical instrument that recreated the aberrations of a retinal image, through which she could both observe and photograph a subject.

At about the same time, Del also invented another device, which he called a "binocular camera." Not a stereoscopic camera, it used two parallel lenses positioned like human eyes, but it produced only one photograph, resulting in an image in which two different exposures

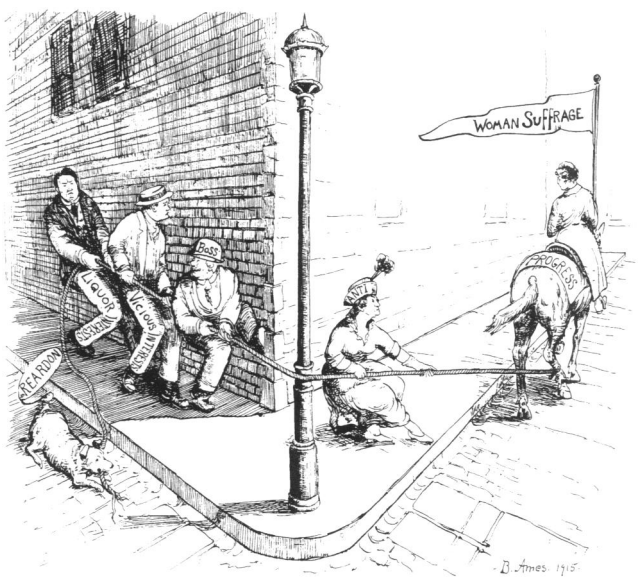

Fig. 4. Blanche Ames Ames, "Anti-Allies and the Dog," editorial cartoon originally published in *Woman's Journal* (October 1915). (© 1997 Ames heirs. Courtesy of Oakes Plimpton. Collection of the Ames Family Papers, Sophia Smith Collection, Smith College.)

Fig. 5. Blanche Ames Ames, *Fruit and Candles*, oil on canvas, 40 × 28 in, 1922. In this painting, using a method developed collaboratively with her brother, Blanche Ames Ames tried to simulate the visual characteristics of a retinal image. (© 1997 Ames heirs. Courtesy of Oakes Plimpton and Borderland State Park.)

were both offset and superimposed. Using this instrument, it was his intention to try to produce not just a single retinal image but two retinal images superimposed, or what Del referred to in the article as a "mental visual image," which he posited was in the brain [26].

As early as the summer of 1920, Del had begun to provide Blanche with copies of drafts of this paper, which he referred to as "my paper," asking for her corrections, and, on at least one occasion, in January 1922, she sent him some minor corrections [27]. But on 20 February 1922, she sent him a long letter in which she expressed her growing concern about the omission of her name from authorship of the paper. From the entry in Oakes's diary on the same day, it is evident that the letter came about as a result of a lengthy discussion between Oakes and Blanche, a discussion in which he convinced her, in Oakes's words, that "Del has overstepped the rights of his colleague, disregarded her partnership and unmindful of the past has put himself in a position to profit by thoughts and help which he has failed to acknowledge" [28].

This was not the first discussion in which Oakes had voiced this objection. As early as 1920, he revealed in another diary entry, "I warned Blanche of the situation, and gave her the data on which I based my conclusions, but in her loyal devotion to Del and in her confidence in his breadth of vision and love of fair play she doubted the correctness of my deductions. In fact we often came to serious passes" [29]. Blanche said the same in her letter to Del:

> It [the question of joint authorship] has caused me a good deal of distress because it has been the basis of considerable friction between Oakes and myself. At first, besides being irritated at his manner of expressing himself, I thought he was quite wrong in his reasoning and deductions but I have slowly come to believe that he is right about it—and that inadvertently we [she and Del] have drifted into a somewhat anomalous situation [30].

The point, wrote Blanche, is simply this:

> That we stand in relation to each other as collaborators. We began this work that has led up to this paper on ["Vision and the Technique of Art"]. We worked together, we painted together, we experimented together, we read together. The subject required scientific research, which necessitated your going to Worcester and then to Dartmouth. In this scientific work I could not join you though goodness knows I longed to. But I have kept on trying to apply the facts we learned by experience and to test out the data you found in your experiments [31].

The tone of the letter is restrained and reasonable, and it ends with a clear and obliging appeal:

> I should not like to injure your outlook in anyway. If I thought it would I should not suggest this change, for a moment. But since it is customary in a scientific work, a custom based on varied experiences, and since I think it will be advantageous to the whole scheme, I do make the suggestion that we appear as joint authors [32].

Soon after, Blanche received a note in which Del indicated that he planned to visit Borderland on 9 March, at which time she and he could talk about the matter of collaboration. That meeting, as it turned out, was disastrous, since it led to a painful and permanent rift in Blanche and Del's relationship. When Oakes reached home on that day, he found that Blanche had just emerged from a meeting with Del. "Blanche was in tears," he noted in his diary,

> because the conference had been a revelation to her of Del's complete forgetfulness, not only of the association for a purpose, but of her gladly given suggestions, helpful criticism and telling contributions. Del in his egotism had come to feel that he owed nothing to Blanche but that she owed him much. He was even unmindful of the original compact when Blanche accepted him as a collaborator in her studio and helped him to grow up in art [33].

Later in the same day, Del also met alone with Oakes, during which (according to Oakes) he admitted "that he had been guilty of an unwitting injustice to Blanche," that she should appear as a co-author and henceforth that Del would be limited to scientific investigations of their painting methods (he had "no intention of taking up painting again") while Blanche would hold exclusive rights to their artistic consequences [34]. Nevertheless, when Del departed that evening, while agreeing to joint authorship, he continued to hold the position "that none of [Blanche's] contributions [had] influenced his research in any way" [35].

The next morning, as described in Oakes's diary, "Blanche awoke with a new outlook on her artistic relations with Del. She decided to withdraw absolutely from joint work, to refuse joint authorship of the paper and to begin a

new relationship in which she would do her own work and cease to share her product with Del" [36]. After telephoning Del to withdraw her request for co-authorship, she mailed him a letter of explanation.

Six days later, not having received a reply, Blanche wrote Del another letter. However, because drafts exist of two letters that appear to have been written on 16 March, one of which is undated, it is unclear which letter was actually sent. Further, the dated letter appears to have been written by Oakes, then revised to make it a letter from Blanche. In this letter, it is revealed that Blanche had given Del $1,000 a year to support his research at Clark University, then at Dartmouth and had paid the salary of his assistant.

In the other letter, which she describes as having been "written after a night of agony," she explains that the greatest calamity was "to find my idol shattered. You have been so dear to me from the time you were a little boy, and I have been so proud of you, of your standards, of your life!" [37]

She continued: "To find that in your eyes I was nothing, my work was nothing, my thought amounted to nothing except a reflection of you, that even my success in my profession meant nothing to you except as it might add to your prestige or authority, shook me to the very soul" [38].

Unknown to Blanche, Del had written her a note on the day before, responding to her letter of 11 March, explaining that he had been ill from a winter cold and emotional stress. He played down the importance of scientific attribution, especially when applied to art. "The paper will mold unknown on the shelves," he predicted, "while artists will be praised for the beauty of their paintings in which they made use of the scientific ideas" [39]. Look at the history of art, he argued: "The name of no scientist as a scientist has lived in art. Who discovered perspective? Who worked out the ideas used by Monet and Pissaro?" [40]. It was not an issue worth fighting about, he concluded, because "no one ever got credit for work he did not do and no one who does real work will fail to get credit for it" [41].

In the meantime, Del received Blanche's letter of 16 March, to which he replied on the following day with a long letter, repeating that he had been slow to respond because of illness: "Because I do not express them does not mean that pain and outraged senses are not in me," he explained, "I am just recovering from an illness produced by the whole affair that stretched me on my back" [42].

In the remainder of the letter, he tried to respond to the various points that Blanche had raised in her letters: He would arrange, as she had asked, to patent the color charts in her name. If she wrote a book about their collaborative work for artists, he would contribute to it by providing diagrams and other illustrations. As for the future of his own research, he predicted that he would be focusing on "the rotation of the retinal fields and rivalry of the retinal fields and of nasal and temporal halves of the fields and rivalry of contours" [43]. And as far as Blanche's and Oakes's request "that I abandon art to you and confine myself to science and my inventions, if you will make that request again at the end of six months I will answer it" [44].

Two years earlier, Del had married Fanny Hazen. He concluded the letter by promising Blanche that "next to my love and relationship with Fanny, yours was the dearest I had in the world and no matter what you do or what you say I will try to keep it so" [45]. When the paper was published, Blanche was listed as a co-author. But Del never painted again, and never again did he and Blanche collaborate. While their relationship was cordial in later years, it appears that their closeness was never restored.

AFTERWORD

Following the breakup with his sister, Del remained at Dartmouth College, where in 1928 he diagnosed a visual dysfunction called aniseikonia, in which the two retinal images are so different that the brain cannot readily fuse them as one. This discovery and his subsequent invention of corrective lenses led to the extraordinary growth of the Dartmouth Eye Institute, which began with 10 patients in 1926 (before the diagnosis of aniseikonia) and increased to more than 8,000 by 1941 [46]. However, as early as the mid-1930s, Del's primary interest had begun to shift from optical physiology to perceptual psychology and philosophy. By the time of his death in 1955, he had developed more than 30 remarkable visual illusions, known as the "Ames Demonstrations in Perception" [47]. Often featured in psychology textbooks, these ingenious demonstrations have led to continued interest in his work among psychologists, philosophers, educators and artists [48].

Blanche continued to paint for the rest of her life, often using the color notation system that she and her brother had invented [49]. As illustrator for her husband's scientific papers on orchids until his death in 1950, she is now chiefly remembered as a botanical illustrator [50]. Her art, according to one writer, "was the integrating force in her life, tying together the threads of her other interests" [51]. Throughout her long, productive life, she was an active advocate of women's rights, birth control, health care and ecology. She died in 1969.

Acknowledgments

This research was made possible in part by funding provided by the Graduate College at the University of Northern Iowa, Cedar Falls. I am also appreciative of the cooperation of the families of both Adelbert Ames II and Blanche Ames Ames; Ellenor Yahrmarkt at Borderland State Park, North Easton, Massachusetts; Amy Hague, Sophia Smith Collection at Smith College, Northampton, Massachusetts; and Paul Whitson at the University of Northern Iowa.

References and Notes

1. For further information on the life of Blanche Ames Ames, see Bonnie L. Crane, *Blanche Ames: Artist and Activist (1878–1969)* (Brockton, MA: Brockton Art Museum, 1982); and Pauline Ames Plimpton, ed., *Oakes Ames: Jottings of a Harvard Botanist 1874–1950* (Cambridge, MA: Botanical Museum of Harvard Univ., 1979).

2. For illustrated overviews of the life of Adelbert Ames II, see Roy R. Behrens, "The Life and Unusual Ideas of Adelbert Ames, Jr.," *Leonardo* **20**, No. 3, 273–279 (1987); Roy R. Behrens, "Adelbert Ames and the Cockeyed Room," *Print Magazine* **48**, No. 2, 92–97 (1994); and Roy R. Behrens, "Eyed Awry: The Ingenuity of Del Ames," *North American Review* **282**, No. 2, 26–33 (1997).

3. Information on the Ames family can be found in Blanche Butler Ames, *Chronicles of the 19th Century and Family Letters of Blanche Butler and Adelbert Ames* (privately published, 1957); Blanche Ames Ames, *Adelbert Ames 1835–1933* (New York: Argosy-Antiquarian, 1964); and Harriet Robey, *Bay View: A Summer Portrait* (Boston: Howland, 1979).

4. Crane [1] p. 8.

5. Robey [3] p. 305.

6. Robey [3] p. 304.

7. Robey [3] p. 305.

8. Quoted in "Adelbert Ames, Jr.: Pictures as the Eye Sees Them" *Dartmouth Pictorial*, Green Key Issue, unpaged (1941).

9. Plimpton [1] p. 282.

10. *Dartmouth Pictorial* [8].

11. *Dartmouth Pictorial* [8].

12. *Dartmouth Pictorial* [8].

13. Handwritten diary of Oakes Ames, in the collection of Borderland State Park, 13 February 1912 entry.

14. A discussion of various drawing frames and their use by Alberti, Leonardo, Dürer and others is found in Martin Kemp, *The Science of Art* (New Haven, CT: Yale, 1990) chapter IV.

15. Crane [1] p. 15.

16. Oakes Ames diary [13], 10 May 1912 entry.

17. Oakes Ames diary [13], 11 May 1912 entry.

18. Oakes Ames diary [13], 13 May 1912 entry.

19. Oakes Ames diary [13], 15 August 1912 entry.

20. The editorial cartoons by Blanche Ames Ames about women's suffrage are reproduced and documented, along with a written account of her work in support of equal rights, in James J. Kenneally, *Blanche Ames and Woman Suffrage* (North Easton, MA: Friends of Borderland, 1993).

21. Adelbert Ames II, in a letter to Blanche Ames Ames, undated, in the Ames Family Papers, Sophia Smith Collection, Smith College, Northampton, Massachusetts.

22. Adelbert Ames II, "Systems of Color Standards," *Journal of the Optical Society of America* **5** (1921) pp. 160–170.

23. See Adelbert Ames II and Charles A. Proctor, "Dioptrics of the Eye," *Journal of the Optical Society of America* **5** (1921) pp. 22–84; and Adelbert Ames II and Charles A. Proctor, "Aberrations of the Eye," *American Journal of Physiological Optics* **4** (1923) pp. 3–37.

24. Adelbert Ames II, C.A. Proctor and Blanche Ames, "Vision and the Technique of Art," *Daedalus* (American Academy of Arts and Sciences) **58** (1923) p. 47.

25. Ames et al. [23] p. 47.

26. Ames et al. [23] p. 47.

27. See Adelbert Ames II, letter to Blanche Ames Ames, dated 14 May 1921. Ames Family Papers [19].

28. Oakes Ames diary [13], 20 February 1922 entry.

29. Oakes Ames diary [13], 9 March 1922 entry.

30. Blanche Ames Ames, letter to Adelbert Ames II, undated with notation "about February 20, 1922." Ames Family Papers [21].

31. Ames [30].

32. Ames [30].

33. Oakes Ames diary [13], 9 March 1922 entry.

34. Oakes Ames diary [13], 9 March 1922 entry.

35. Oakes Ames diary [13], 9 March 1922 entry.

36. Oakes Ames diary [13], 10 March 1922 entry.

37. Blanche Ames Ames, letter to Adelbert Ames II, dated 16 March 1922. Ames Family Papers [21].

38. Blanche Ames Ames [37].

39. Adelbert Ames II, letter to Blanche Ames Ames, dated 15 March 1922. Ames Family Papers [21].

40. Ames II [39].

41. Ames II [39].

42. Adelbert Ames II, letter to Blanche Ames Ames, dated 17 March 1922. Ames Family Papers [21].

43. Ames II [42].

44. Ames II [42].

45. Ames II [42].

46. For information on the Dartmouth Eye Institute, see David C. Bisno, ed., *Eyes in the Storm: President Hopkin's Dilemma: The Dartmouth Eye Institute* (Norwich, VT: Norwich Press, 1994).

47. Construction diagrams of the demonstrations and instructions for their use can be found in William H. Ittelson, *The Ames Demonstrations in Perception* (New York: Hafner, 1968). Portions of Del Ames's research journal have been published in Hadley Cantril, ed., *The Morning Notes of Adelbert Ames, Jr.* (New Brunswick, NJ: Rutgers Univ. Press, 1960).

48. See, for example, Roy R. Behrens, "Drawing in the Dark: Rembrandt, Pearl Harbor, and the Flash Lab," *Print Magazine* **46**, No. 5, 96–101 (1992).

49. See Crane [1].

50. For information about Blanche's editorial cartoons, see Kenneally [20]. Her botanical illustrations are discussed and reproduced in *Orchids and Artists: Five Centuries of Botanical Illustration from Peter Schoeffer to Blanche Ames '99* (Northampton, MA: Smith College Museum of Art, 1991). See also *Orchids at Christmas* (Cambridge, MA: Botanical Museum of Harvard Univ., 1975).

51. Crane [1] p. 7.

Manuscript received 6 August 1996.